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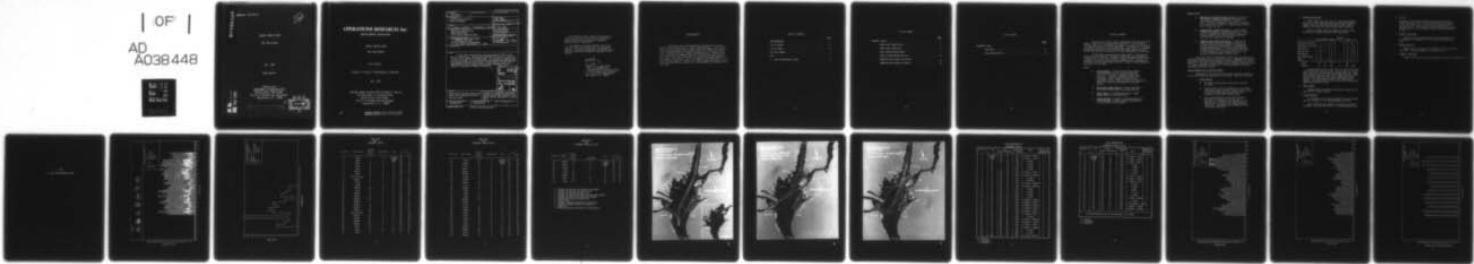
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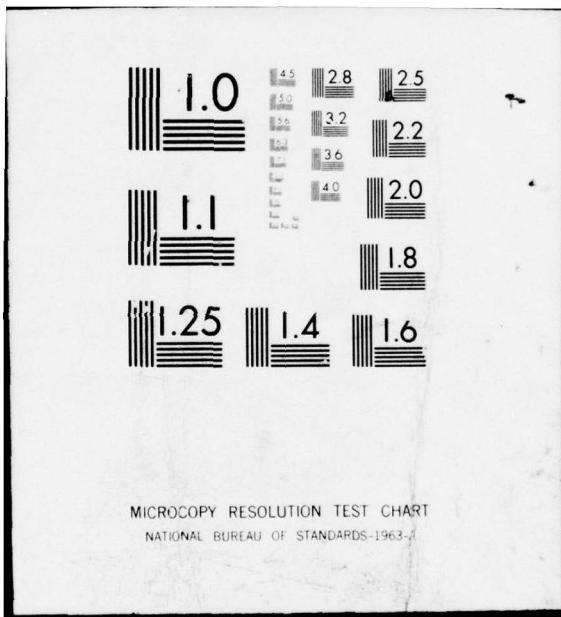
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VESSEL TRAFFIC DATA

NEW YORK HARBOR

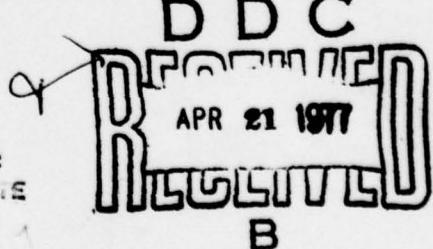
MAY 1976

FINAL REPORT

PREPARED FOR
DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD
OFFICE OF RESEARCH AND DEVELOPMENT
WASHINGTON, D.C. 20590

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OPERATIONS RESEARCH, Inc.

SILVER SPRING, MARYLAND

VESSEL TRAFFIC DATA

NEW YORK HARBOR

FINAL REPORT

L.BUHLER, J.GEIGER, T.NIGHTENGALE, P.WALCOTT

MAY 1976

**PREPARED UNDER CONTRACT DOT-CG-31446-A, TASK 14
FOR DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD
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16. Abstract <p>This report presents data concerning vessel traffic in the New York Harbor Area. The data was obtained from films of a radar PPI at one site in the New York Harbor Area. Also, tapes of communications activity on Channel 13 of the VHF/FM Maritime Mobile Band provided data. Data analysis obtained the following: Vessel Density; Vessel Route Identification; Vessel Speed; Close Encounter; Message Activity, Channel Utilization, and Channel Efficiency.</p>															
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W. L. KING
Captain, U. S. Coast Guard
Chief, Environmental and
Transportation Technology Division
Office of Research and Development
U. S. Coast Guard Headquarters
Washington, D. C. 20590

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EXECUTIVE SUMMARY

This report is a final report in accordance with Contract DOT-CG-31446-A, Task 14, "VTS Statistical Data Analysis." As per the above contract, this report constitutes the eighth in a series of final reports for selected port areas in the United States. This report is a condensed presentation of data concerning the New York Harbor area where vessel traffic was observed for a period of 15 hours (0600-2100) on 13 May 1976.

In the report, data concerning vessel traffic in the New York Harbor area are presented. The data were obtained using the USCG Data Collection Van at one site, Govenors Island. The Data Collection Van is equipped with a radar to monitor vessel movements and a communications receiver to monitor communications activity. Specific data contained in the report is as follows:

RADAR

- Vessel Density - A count of the vessels present at a particular time for the data collection radar site. The count is made at regular time intervals. The data is presented in the form of a histogram. Also, vessels are classified as being small, medium, large, at anchor, or tug with tow according to the size and behavior of the radar return.
- Vessel Route Identification - A chart depicting the routes used by vessels transiting the area.
- Vessel Speed - A histogram and table of vessel speeds observed at the radar site.
- Close Encounter - A count of vessel encounters and close encounters observed, using close encounter criteria derived in this report.

COMMUNICATIONS

- Communications Channel Message Activity - A count of the number of messages transmitted on channel 13 of the VHF/FM Maritime Mobile Band, as a function of time. The data is presented in the form of a histogram with message counts totaled in fifteen-minute intervals over a 15-hour period.
- Communications Channel Utilization - The percentage of time that squelch is broken on channel 13. Utilization is computed for fifteen-minute intervals over a 15-hour period so that the variation in utilization with time of day can be observed.
- Communications Channel Efficiency - A count of the number of valid and invalid messages on channel 13 of the VHF/FM Maritime Mobile Band. Valid messages are those judged to be conforming to the Bridge-to-Bridge Radiotelephone Act. Counts are totaled within fifteen-minute intervals and a histogram of the ratio of valid messages to total messages is given. The abscissa of the histogram is time of day.

The vessel traffic data presented in the report was obtained by analyzing motion pictures of a radar PPI display. Communications data was collected by monitoring tape recordings of the communications activity on channel 13. The radar films and communications tapes were obtained by the U.S. Coast Guard Data Collection Van. In New York Harbor, the van was stationed at Governors Island.

General Observations on New York Harbor

Reviewing all the data on New York Harbor provided in Section I, certain conclusions and observations can be made. They are as follows:

1. Vessel Density

- The highest vessel density count was 37 at 1030 and 1145.
- A peak traffic period is defined as a time interval during which vessel density is greater than or equal to 50% of the peak value for the site, and is sustained for more than fifteen minutes.
- Using this definition of peak traffic periods the total time coverage, 15 hours, was a peak period. Traffic activity showed a uniform density with an average of 29 ships present per time period. Anchored vessels numbered at least 13 for each time period.

2. Route Identification

Traffic density at this site is so great and possible paths are so many, that the routes are at best described as random (see route identification chart for small ships). However, large ships do follow obvious paths in the area.

Below is a table depicting numbers and sizes of ships entering the different channels at New York Harbor.

	Large	Medium	Small	Tug with Tow	Totals	%
Buttermilk Channel		4	7		11	13
Constable Hook Reach	4	4	5		13	15
East River	3	5	8		16	18
Hudson River	4	2	3		9	20
The Narrows	2		8	2	12	14
Bay Ridge Channel	2		1		2	2
Local	9	1	12	1	14	17
Totals	24	17	44	3	88	
Percent	27	19	50	4	100	100

Seventy-three percent of the traffic at this site is thru-traffic while 27% is local traffic. Local traffic is traffic that stops within the periphery of the Upper Bay area. Small ships dominate local and thru-traffic, comprising 50% of the total 88 ships observed in the route identification time period. Only three tugs were seen in the 6 hour period sampled. Large ships make up 27% of the traffic observed and medium ships account for 19%.

3. Vessel Speed

Observed speeds at Governors Island had a range of 4-18 knots with a 9.9 knot average.

4. Close Encounters

The observed rate of close encounter for New York Harbor was 50 in $1\frac{1}{2}$ hours or 33.3 close encounters per hour.

While observing close encounters, account was taken of encounters that were not "close". A close encounter was so

4. (cont'd)

determined if the distance between two vessels was below a certain threshold value. This threshold value was a function of the radar range scale at the site and was 200 yards for New York Harbor. The relationship between encounters and close encounters was 50 close encounters out of 108 total encounters or 46%.

5. Channel Utilization

Channel 13 utilization exhibited a peak percentage of 61 at 1930-1945 and averaged 37% for the time covered on May 13, 1975.

6. Message Activity

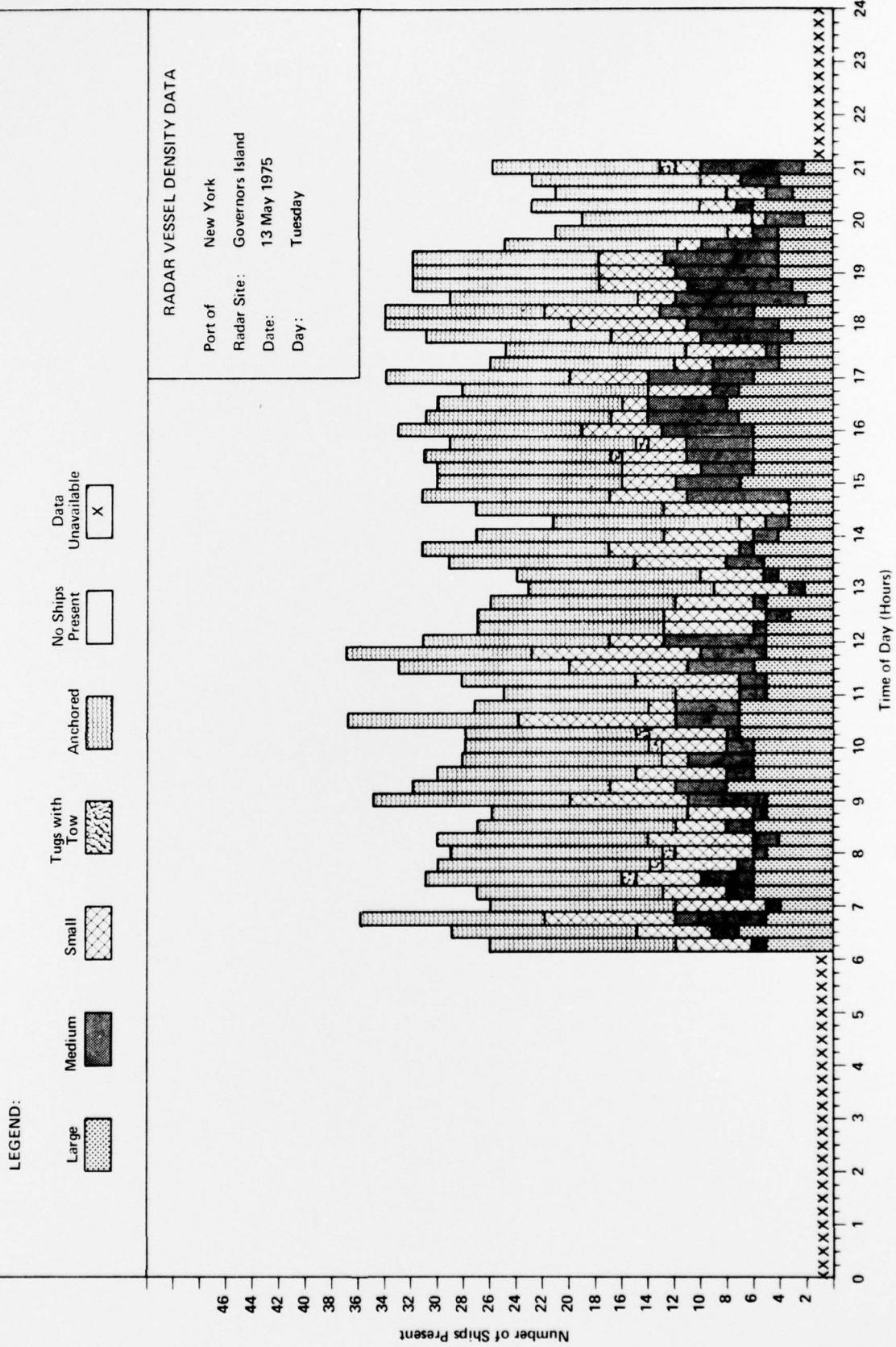
Message activity peaked at 265 messages for the time period 1815-1830. The average number of messages was 124.

7. Channel Efficiency

Channel efficiency had a peak percentage of 91 and an average of 80%.

I. DATA

1.1 DATA FROM GOVERNORS ISLAND



RADAR VESSEL SPEED DATA

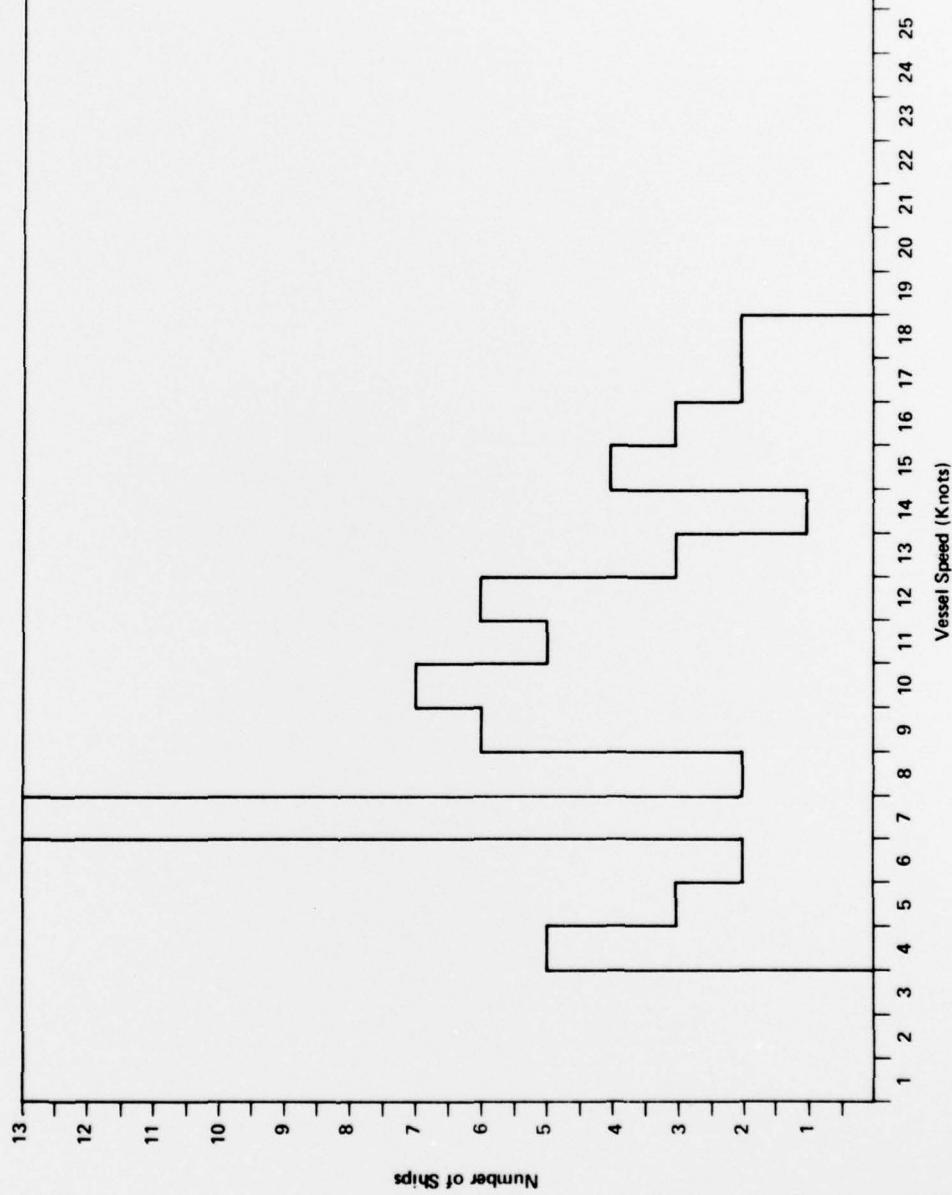
Port of New York

Sample Size: 64

Radar Site: Governor's Island

Date: 13 May 1975

Day: Tuesday



SPEED DATA
FOR
GOVERNORS ISLAND

Vessel #	Vessel Size	Average Speed in Knots	Location*	Day	Time Hr.	Time Min.
1	large	7	A	Tuesday	06	13
2	large	7	B	13 May 1975	06	17
3	large	8	A		06	20
4	large	4	C		06	25
5	large	5	A		06	32
6	medium	13	C		06	43
7	large	6	F		07	17
8	tug with tow	7	F		07	21
9	medium	5	F		07	24
10	large	9	D		07	25
11	large	7	G		07	34
12	medium	10	D		07	46
13	large	4	C		07	59
14	medium	7	A		08	06
15	medium	10	H		08	11
16	medium	11	D		08	37
17	medium	7	H		08	51
18	medium	9	I		09	04
19	medium	9	F		09	07
20	medium	16	F		09	22
21	tug with tow	9	D		09	34
22	medium	12	F		09	34
23	medium	11	D		09	39
24	medium	10	J		09	40
25	medium	10	D		09	41
26	small	12	J		10	00
27	large	4	B		10	01
28	large	4	F		10	01

SPEED DATA
FOR
GOVERNORS ISLAND (Cont'd)

Vessel #	Vessel Size	Average Speed in Knots	Location*	Day	Time Hr.	Time Min.
29	large	16	F	Tuesday 13 May 1975	10	05
30	medium	12	G		10	09
31	large	15	F		10	10
32	medium	7	G		10	25
33	medium	8	G		10	43
34	medium	18	G		10	52
35	large	6	J		11	12
36	medium	7	H		11	19
37	medium	15	H		11	20
38	large	9	A		11	20
39	medium	12	D		11	23
40	large	7	G		11	37
41	large	5	G		11	52
42	large	13	E		12	06
43	medium	10	H		12	25
44	medium	7	H		12	26
45	large	7	D		13	11
46	large	16	E		13	28
47	medium	18	D		13	30
48	small	17	H		13	41
49	small	17	D		13	44
50	large	15	E		13	45
51	small	11	H		13	47
52	small	10	G		13	59
53	medium	7	D		14	04
54	medium	14	D		14	12
55	small	12	K		14	15
56	medium	9	D		14	47

SPEED DATA
FOR
GOVERNORS ISLAND (Cont'd)

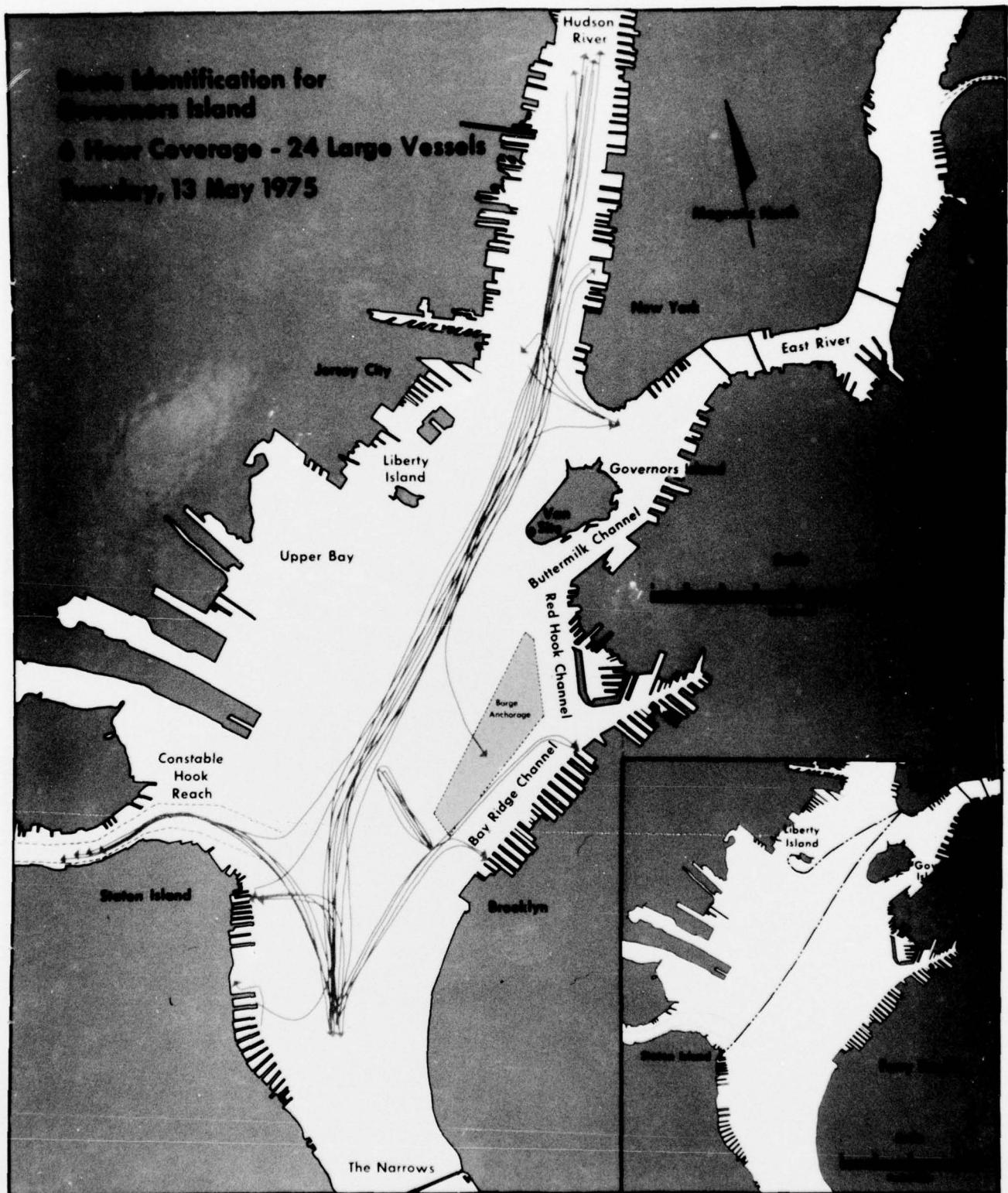
Vessel #	Vessel Size	Average Speed in Knots	Location*	Day	Time Hr. Min.	
57	medium	13	D	Tuesday 13 May 1975	14	51
58	medium	11	K		14	53
59	medium	7	G		14	55
60	large	4	G		14	59
61	large	10	C		15	01
62	medium	11	G		15	06
63	small	15	G		15	14
64	small	12	G		15	15

- * A - Between the Narrows and Constable Hook Reach
- B - Between the Narrows and Hudson River
- C - Between the Narrows and Upper Bay
- D - Between Constable Hook Reach and Buttermilk Channel
- E - Between the Narrows and Buttermilk Channel
- F - Between Upper Bay and Hudson River
- G - Hudson River
- H - Between Constable Hook Reach and Upper Bay
- I - Between Buttermilk Channel and Upper Bay
- J - Upper Bay
- K - Between Constable Hook Reach and Hudson River

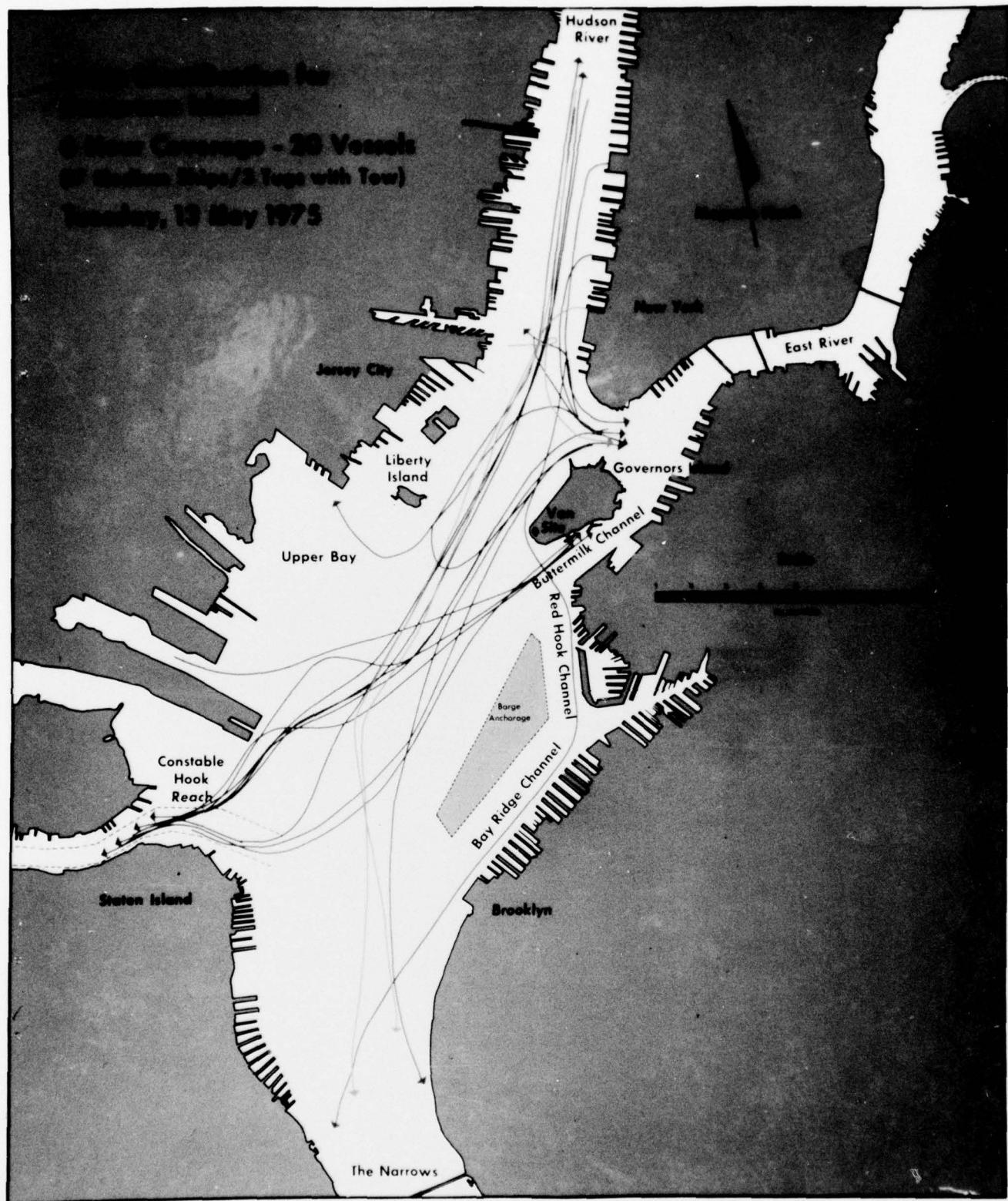
**Route Identification for
Governors Island**

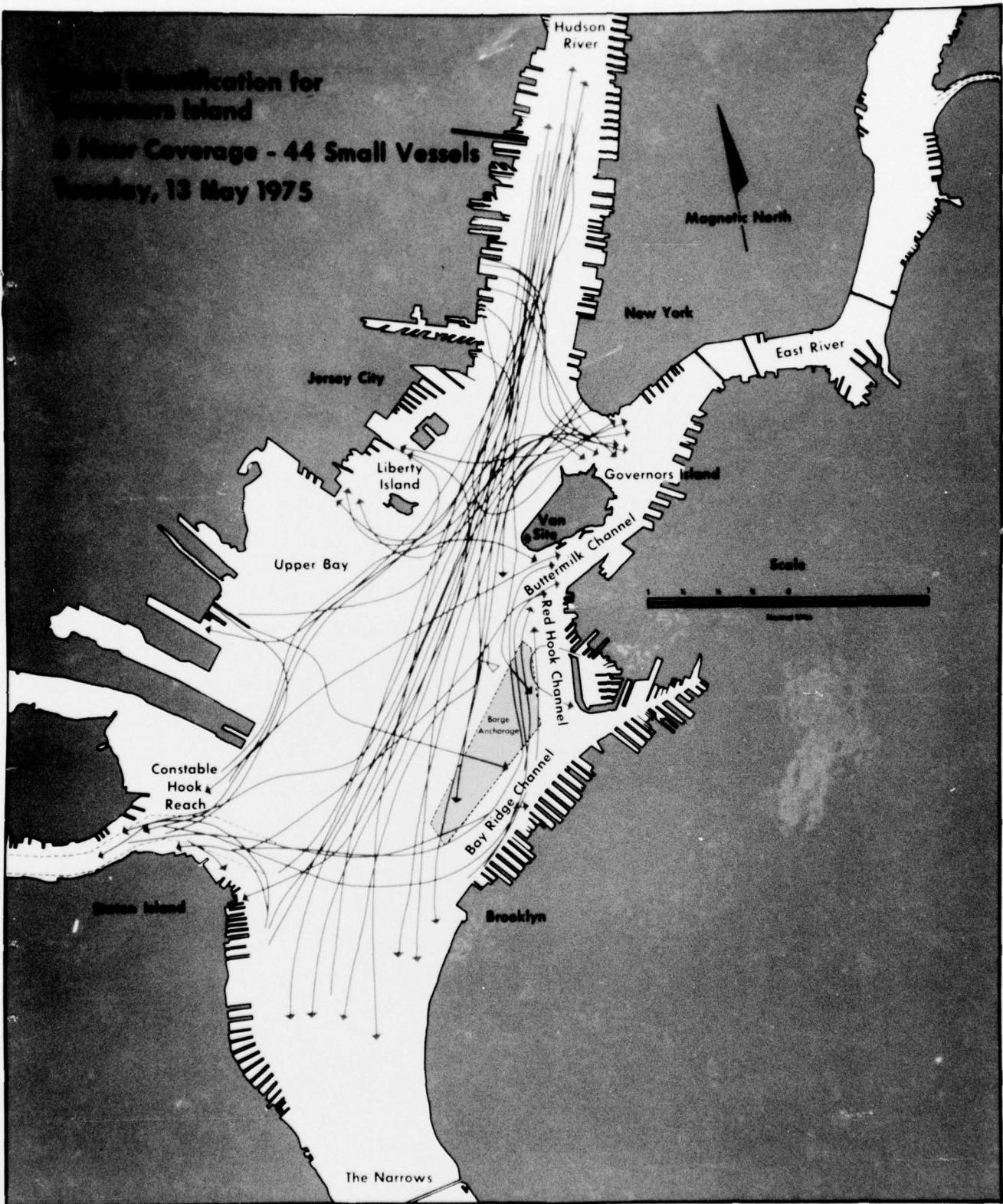
6 Hour Coverage - 24 Large Vessels

Tuesday, 13 May 1975



?





CLOSE ENCOUNTER FOR
GOVERNORS ISLAND

Vessel #	Day	Time Hours Minutes	Distance Yards	Size	Manner of Approach*
1	Tuesday 13 May 1975	06 14	100	1 large, 1 small	P
2		06 15	200	1 large, 1 small	P
3		06 19	200	2 small	O
4		06 19	100	2 large	P
5		06 21	100	2 large	P
6		06 24	<100	2 small	P
7		06 26	100	1 large, 1 small	P
8		06 26	<100	1 large, 1 medium	P
9		06 28	<100	2 large	P
10		06 29	100	2 medium	P
11		06 32	100	1 large, 1 medium	C
12		06 32	<100	1 large, 1 medium	P
13		06 33	150	2 large	P
14		06 35	<100	2 large	P
15		06 35	<100	2 small	P
16		06 35	<100	2 large	P
17		06 36	<100	1 medium, 1 small	P
18		06 37	<100	1 large, 1 small	P
19		06 39	<100	1 medium, 1 small	P
20		06 39	150	1 large, 1 small	O
21		06 40	<100	1 large, 1 small	P
22		06 41	150	1 large, 1 small	P
23		06 41	<100	2 large	P
24		06 42	<100	1 large, 1 medium	O
25		06 45	<100	1 medium, 1 small	P
26		06 46	<100	1 large, 1 small	O
27		06 47	150	1 large, 1 medium	P
28		06 49	<100	2 large	P
29		06 49	<100	2 large	P
30		06 51	<100	1 large, 1 small	P

*P = Passing
O = Overtaking
C = Crossing

CLOSE ENCOUNTER FOR
GOVERNORS ISLAND (cont'd)

Vessel #	Day	Time Hours Minutes	Distance Yard	Size	Manner of Approach*
31	Tuesday	06 53	<100	1 large, 1 small	P
32	13 May 1975	06 53	100	1 large, 1 small	C
33		06 55	<100	1 large, 1 small	P
34		06 57	200	2 large	P
35		06 57	100	2 large	P
36		06 58	<100	2 large	O
37		07 00	150	2 small	P
38		07 00	<100	1 large, 1 small	O
39		07 03	100	1 large, 1 small	P
40		07 05	100	1 large, 1 small	P
41		07 05	<100	2 large	P
42		07 05	150	2 large	P
43		07 09	<100	2 small	P
44		07 19	150	2 large	P
45		07 20	<100	2 large	P
46		07 21	100	1 large, 1 medium	P
47		07 27	100	2 large	P
48		07 30	150	1 tug w/tow, 1 large	O
49		07 31	<100	1 medium, 1 small	P
50		07 33	<100	1 medium, 1 small	P

50 close encounters out of 108 encounters in 1½ hours.

*P = Passing
O = Overtaking
C = Crossing

